

WHAT IS CLAIMED IS:

1           1. In a wireless telecommunications system having a  
2     Base Transceiver Station (BTS) and a mobile terminal equipped  
3     with a Global Positioning System (GPS) equipped receiver, the  
4     Base Transceiver Station having operational control of the  
5     GPS-equipped mobile terminal, a method for determining the  
6     approximate position of the GPS-equipped mobile terminal,  
7     said method comprising the steps of:  
8                 demodulating signals received from a multiplicity  
9     of GPS satellites at a reference GPS receiver, said reference  
10    GPS receiver being connected to the wireless  
11    telecommunications system and having a determinate physical  
12    location relative to the Base Transceiver Station;  
13                 recovering respective navigational data signals  
14    from each of said demodulated GPS signals;  
15                 originating a request for approximate navigational  
16    information from the GPS-equipped mobile terminal to the Base  
17    Transceiver Station;  
18                 transmitting recovered navigational data signals  
19    to the GPS-equipped mobile terminal responsive to said  
20    request for approximate navigational information; and

U.S. Patent Application  
Docket No. 27943-00252USPT

21           determining, from said transmitted navigational  
22   data signals, the approximate location of the GPS-equipped  
23   mobile terminal.

1           2.   The method according to Claim 1, wherein said  
2   signals from the GPS satellites are Standard Positioning  
3   Service (SPS) signals received on an L1 frequency, said L1  
4   frequency being centered at about 1575.42 MHz.

1           3.   The method according to Claim 1, wherein said  
2   signals from the GPS satellites are Precise Positioning  
3   Service (PPS) signals received on an L2 frequency, said L2  
4   frequency being centered at about 1227.60 MHz.

1           4.   The method according to Claim 1, wherein said  
2   approximate navigational information comprises the identities  
3   of a plurality of GPS satellites within ranging distance, the  
4   orbital parameters associated with said plurality of GPS  
5   satellites, clock correction information and differential  
6   correction information associated with said plurality of GPS  
7   satellites.

2025-10-10 10:10:10

U.S. Patent Application  
Docket No. 27943-00252USPT

1           5.    The method according to Claim 1, wherein said step  
2   of originating said request for approximate locational  
3   information from the GPS-equipped mobile terminal to the Base  
4   Transceiver Station is responsive to activation of the mobile  
5   terminal.

1           6.    The method according to Claim 1, wherein said step  
2   of originating said request for approximate locational  
3   information from the GPS-equipped mobile terminal to the Base  
4   Transceiver Station is responsive to placing a call from the  
5   GPS-equipped mobile terminal to one of a set of designated  
6   numbers.

1           7.    The method according to Claim 6, wherein said one  
2   designated number is associated with an emergency service.

1           8.    The method according to Claim 1, wherein said step  
2   of originating said request for approximate locational  
3   information from the GPS-equipped mobile terminal to the Base  
4   Transceiver Station is responsive to a determination by the  
5   reference GPS receiver that the GPS signal strength at the  
6   GPS-equipped mobile terminal is inadequate to permit

09219199-122299

7 initialization of the reference GPS receiver associated with  
8 the GPS-equipped mobile terminal within a desired response  
9 time.

Sub C2  
1 9. The method according to Claim 1, wherein said step  
2 of transmitting is performed as a Cell Broadcast (CB) Short  
3 Message Service (SMS) message of the wireless  
4 telecommunications system.

1 10. The method according to Claim 1, wherein said step  
2 of transmitting is performed over a Broadcast Control Channel  
3 (BCCH) of the wireless telecommunications system.

Sub C3  
1 11. The method according to Claim 1, further comprising  
2 the step of:  
3 periodically transmitting a Timing Advance  
4 parameter from the Base Transceiver Station to the GPS-  
5 equipped mobile terminal to dynamically compensate for  
6 varying distances between the GPS-equipped mobile terminal  
7 and the Base Transceiver Station.

1           12. The method according to Claim 11, further  
2 comprising the step of:

3           refining said approximate location of the GPS-  
4 equipped mobile terminal using said Timing Advance parameter.

Sub  
A2  
8622161650  
1           13. In a wireless telecommunications system having a  
2 Base Transceiver Station and a mobile terminal equipped with  
3 a Global Positioning System (GPS) receiver, the Base  
4 Transceiver Station having operational control of the GPS-  
5 equipped mobile terminal, a method for determining the  
6 approximate position of the GPS-equipped mobile terminal,  
7 said method comprising the steps of:

8           demodulating signals received from a multiplicity  
9 of GPS satellites at a reference GPS receiver, said reference  
10 GPS receiver being connected to the wireless  
11 telecommunications system and having a determinate physical  
12 location relative to the Base Transceiver Station;

13           computing an estimated location of said reference  
14 GPS receiver using said demodulated signals from said GPS  
15 satellites;

16           originating a request for approximate locational  
17   information from the GPS-equipped mobile terminal to the Base  
18   Transceiver Station;

19           transmitting said estimated location of said  
20   reference GPS receiver from the Base Transceiver Station to  
21   the GPS-equipped mobile terminal responsive to said request  
22   for approximate locational information; and

23           determining, from said transmitted location of said  
24   reference GPS receiver, the approximate location of the GPS-  
25   equipped mobile terminal.

1           14. The method according to Claim 13, wherein said step  
2   of computing the estimated location of said reference GPS  
3   receiver further comprises the steps of:

4           recovering respective navigational data signals  
5   from each of said demodulated GPS signals from said GPS  
6   satellites; and

7           computing, from the respective navigational data  
8   signals, the location of said reference GPS receiver.

1           15. The method according to Claim 14, wherein said  
2   respective navigational data signals comprise orbital

3 parameters associated with a plurality of GPS satellites,  
4 clock correction information and differential correction  
5 information.

1 16. The method according to Claim 13, wherein said  
2 method further comprises, after said step of computing and  
3 before said step of originating, the step of:

4 storing said estimated location of said reference  
5 GPS receiver in said wireless telecommunications system.

1 17. The method according to Claim 13, wherein said step  
2 of originating said request for approximate locational  
3 information from the GPS-equipped mobile terminal to the Base  
4 Transceiver Station is responsive to activation of the GPS-  
5 equipped mobile terminal.

1 18. The method according to Claim 13, wherein said step  
2 of originating said request for approximate locational  
3 information from the GPS-equipped mobile terminal to the Base  
4 Transceiver Station is responsive to placing a call from the  
5 GPS-equipped mobile terminal to one of a set of designated  
6 numbers.

1        22. The method according to Claim 13, wherein said step  
2        of transmitting is performed over a Broadcast Control Channel  
3        (BCCH) of the wireless telecommunications system.



1           23. The method according to Claim 13, wherein the  
2           estimated location of said reference GPS receiver is used as  
3           the approximate location of the GPS-equipped mobile terminal.

5/23/91  
SUB  
26221-661260  
1           24. In a wireless telecommunications system having a  
2           Base Transceiver Station and a mobile terminal equipped with  
3           a Global Positioning System (GPS) receiver, the Base  
4           Transceiver Station having operational control of the GPS-  
5           equipped mobile terminal, a system for determining the  
6           approximate position of the GPS-equipped mobile terminal,  
7           said system comprising:

8                   demodulation means for demodulating signals  
9           received from a multiplicity of GPS satellites at a reference  
10          GPS receiver, said reference GPS receiver being connected to  
11          the wireless telecommunications system and having a  
12          determinate physical location relative to the Base  
13          Transceiver Station;

14                   signal recovery means for recovering navigational  
15          data signals from each of said demodulated signals from said  
16          GPS satellites;

17            requesting means for requesting approximate  
18            navigational information for the GPS-equipped mobile terminal  
19            from the Base Transceiver Station;

20            transmission means for transmitting said recovered  
21            navigational data signals to the GPS-equipped mobile terminal  
22            responsive to said request for approximate navigational  
23            information; and

24            determination means for determining, from said  
25            transmitted navigational data signals to determine the  
26            approximate location of the GPS-equipped mobile terminal.

1            25. The system according to Claim 24, wherein said  
2            signals from the GPS satellites are Standard Positioning  
3            Service (SPS) signals received on an L1 frequency, said L1  
4            frequency being centered at about 1575.42 MHz.

1            26. The system according to Claim 24, wherein said  
2            signals from the GPS satellites are Precise Positioning  
3            Service (PPS) signals received on an L2 frequency, said L2  
4            frequency being centered at about 1227.60 MHz.

U.S. Patent Application  
Docket No. 27943-00252USPT

1           27. The system according to Claim 24, wherein said  
2 approximate navigational information comprises the identities  
3 of a plurality of GPS satellites within ranging distance, the  
4 orbital parameters associated with said plurality of GPS  
5 satellites, clock correction information and differential  
6 correction information associated with said plurality of GPS  
7 satellites.

1           28. The system according to Claim 24, wherein said  
2 requesting means is responsive to activation of the mobile  
3 terminal.

1           29. The system according to Claim 24, wherein said  
2 requesting means is responsive to placing a call from the  
3 GPS-equipped mobile terminal to one of a set of designated  
4 numbers.

1           30. The system according to Claim 24, wherein said one  
2 designated number is associated with an emergency service.

Sub  
CP

3 31. The system according to Claim 24, wherein said  
4 requesting means is responsive to a determination by the  
5 reference GPS receiver that GPS signal strength at the GPS-  
6 equipped mobile terminal is inadequate to permit the  
7 initialization of the reference GPS receiver associated with  
8 the GPS-equipped mobile terminal within a desired response  
9 time.

1 32. The system according to Claim 24, wherein said  
2 transmission means comprises a Cell Broadcast (CB) Short  
3 Message Service (SMS) message over the wireless  
4 telecommunications system.

1 33. The system according to Claim 24, wherein said  
2 transmission means comprises a Broadcast Control Channel  
3 (BCCH) of the wireless telecommunications system.

Sub  
CP

1 34. The system according to Claim 24, further  
2 comprising:

3 means for periodically transmitting a Timing  
4 Advance parameter from the Base Transceiver Station to the  
5 GPS-equipped mobile terminal to dynamically compensate for

6 varying distances between the GPS-equipped mobile terminal  
7 and the Base Transceiver Station.

1 35. The system according to Claim 34, further  
2 comprising:

3 means for refining said approximate location of the  
4 GPS-equipped mobile terminal using said Timing Advance  
5 parameter.

1 36. In a wireless telecommunications system having a  
2 Base Transceiver Station and a mobile terminal equipped with  
3 a Global Positioning System (GPS) receiver, the Base  
4 Transceiver Station having operational control of the GPS-  
5 equipped mobile terminal, a system for determining the  
6 approximate position of the GPS-equipped mobile terminal,  
7 said system comprising:

8 a demodulator for demodulating signals received  
9 from a multiplicity of GPS satellites at a reference GPS  
10 receiver, said reference GPS receiver being connected to the  
11 wireless telecommunications system and having a determinate  
12 physical location relative to the Base Transceiver Station;

13            computing means for determining an estimated  
14            location of said reference GPS receiver using said  
15            demodulated signals from said GPS satellites;

16            requesting means for requesting approximate  
17            locational information from the GPS-equipped mobile terminal  
18            to the Base Transceiver Station;

19            a transmitter for transmitting the location of said  
20            reference GPS receiver from the Base Transceiver Station to  
21            the GPS-equipped mobile terminal responsive to said request  
22            for said approximate locational information; and

23            determination means for determining the approximate  
24            location of the GPS-equipped mobile terminal using said  
25            transmitted location of said reference GPS receiver.

1            37. The system according to Claim 36, wherein said  
2            computing means further comprises:

3            decoder means for recovering respective  
4            navigational data signals from each of said demodulated  
5            signals from said GPS satellites; and

6            computing means for computing the location of said  
7            reference GPS receiver from said respective navigational data  
8            signals.

U.S. Patent Application  
Docket No. 27943-00252USPT

1           38. The system according to Claim 37, wherein said  
2       respective navigational data signals comprise the orbital  
3       parameters associated with a plurality of GPS satellites,  
4       clock correction information and differential correction  
5       information.

1           39. The system according to Claim 36, wherein said  
2       computing means further comprises:

3               storage means for storing said estimated location  
4       of said reference GPS receiver in said wireless  
5       telecommunications system.

1           40. The system according to Claim 36, wherein said  
2       requesting means is responsive to activation of the mobile  
3       terminal.

1           41. The system according to Claim 36, wherein said  
2       requesting means is responsive to placing a call from the  
3       GPS-equipped mobile terminal to one of a set of designated  
4       numbers.

00219199-122222

U.S. Patent Application  
Docket No. 27943-00252USPT

1           42. The system according to Claim 41, wherein said one  
2           designated number is associated with an emergency service.

362227-122222  
1           43. The system according to Claim 36, wherein said  
2           requesting means is responsive to a determination by the  
3           reference GPS receiver that GPS signal strength at the GPS-  
4           equipped mobile terminal is inadequate to permit  
5           initialization of the reference GPS receiver associated with  
6           the GPS-equipped mobile terminal within a desired response  
7           time.

1           44. The system according to Claim 36, wherein said  
2           transmitter transmits a Cell Broadcast (CB) Short Message  
3           Service (SMS) message over the wireless telecommunications  
4           system.

1           45. The system according to Claim 36, wherein said  
2           transmitter transmits over a Broadcast Control Channel (BCCH)  
3           of the wireless telecommunications system.



U.S. Patent Application  
Docket No. 27943-00252USPT

1           46. The system according to Claim 36, wherein the  
2       estimated location of said reference GPS receiver is used as  
3       the approximate location of the GPS-equipped mobile terminal.

091919 12299  
002222 66T6T260